

Appl. No. 10/708,700
Amdt. dated August 31, 2005
Reply to Office action of June 02, 2005

AMENDMENTS TO THE CLAIMS

1. (currently amended) A switched capacitor circuit used in an oscillator circuit, the
switched capacitor comprising:
- 5 a capacitor;
- a first switch element for selectively coupling a first node to a second node
according to a control signal, wherein the first node is coupled to the capacitor, the
capacitor is further connected to an oscillation node in the oscillator circuit; and
- 10 a charge circuit coupled to the first node for coupling the first node to a third node
being at a first predetermined charge voltage, wherein when the first switch element
is switched off, the charge circuit and for controls controlling a voltage difference
across the first switch element ~~in the off-state to approach a~~ second predetermined
15 charge voltage.
2. (original) The switched capacitor circuit of claim 1, wherein the charge circuit
selectively couples the first node to the third node according to the control signal.
- 20 3. (currently amended) The switched capacitor circuit of claim 2, wherein the charge
circuit comprises:
- a diode coupled between the first node and a fourth node; and
- 25 a ~~second~~ third switch element for selectively coupling the fourth node to the third
node according to the control signal.
4. (currently amended) The switched capacitor circuit of claim 3, wherein:

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the diode is formed by a transistor having its the base and the collector being
shorted together, or having its the gate and the drain of the first transistor being
shorted together.

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5. (currently amended) The switched capacitor circuit of claim 3, wherein:

the first switch element is an n-type transistor;

the secondthird switch element is a p-type transistor;

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the second node is ground; and

the third node is a constant supply voltage.

6. (currently amended) The switched capacitor circuit of claim 3, wherein:

the first switch element is a p-type transistor;

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the secondthird switch element is an n-type transistor;

the second node is a constant supply voltage; and

the third node is ground.

7. (currently amended) A switched capacitor circuit comprising:

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a positive side capacitor;

a negative side capacitor;

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a first positive side switch element for selectively coupling a first positive side node
to a second node according to a control signal, wherein the first positive side node is
coupled to the positive side capacitor;

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a first negative side switch element for selectively coupling a first negative side node to the second node according to the control signal, wherein the first negative side node is coupled to the negative side capacitor; and

5 a charge circuit coupled to the first positive side node and the first negative side node for coupling the first positive side node and the first negative side node to a third node being at a first predetermined charge voltage, wherein when the first positive side switch element and the first negative side switch element are switched off, the charge circuit and for controls controlling a first voltage difference across
10 the first positive side switch element ~~in the off state and a second voltage difference across the first negative side switch element in the off state~~ to approach a second predetermined charge voltage.

8. (original) The switched capacitor circuit of claim 7, wherein the charge circuit
15 selectively couples the first positive side node and the first negative side node to the third node according to the control signal.

9. (currently amended) The switched capacitor circuit of claim 8, wherein the charge
20 circuit comprises:

a positive side diode coupled between the first positive side node and a fourth node;

a negative side diode coupled between the first negative side node and a fourth node;
and
25 a ~~second~~third switch element for selectively coupling the fourth node to the third node according to the control signal.

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10. (currently amended) The switched capacitor circuit of claim 9, wherein:

the positive side diode is formed by a first transistor having ~~the~~its base and the
collector being shorted together, or having its the gate and ~~the drain of the first~~
5 transistor ~~being shorted together~~; and

the negative side diode is formed by a second transistor having ~~the~~its base and the
collector being shorted together, or having its the gate and ~~the drain of the second~~
transistor ~~being shorted together~~.

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11. (currently amended) The switched capacitor circuit of claim 9, wherein:

the first positive side switch element is an n-type transistor;
the first negative side switch element is an n-type transistor;
15 the second~~third~~ switch element is a p-type transistor;
the second node is ground; and
the third node is a constant supply voltage.

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12. (currently amended) The switched capacitor circuit of claim 9, wherein:

the first positive side switch element is a p-type transistor;
the first negative switch element is a p-type transistor;
the second~~third~~ switch element is an n-type transistor;
the second node is a constant supply voltage; and
25 the third node is ground.

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13. (original) The switched capacitor circuit of claim 7, further comprising a center
switch element for selectively coupling the first positive side node to the first

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negative side node according to the control signal.

14. (original) A method for controlling a switched capacitor circuit, the method comprising the following steps:

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providing a capacitor and a first switch element;

disconnecting a first node from a second node according to a control signal utilizing the first switch element, wherein the first node is coupled to the capacitor; and

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coupling the first node to a third node being at a first predetermined charge voltage for controlling a voltage difference across the first switch element in the off-state to approach a second predetermined charge voltage.

- 15 15. (original) The method of claim 14, further comprising selectively coupling the first node to the third node according to the control signal.

16. (currently amended) The method of claim 15, wherein selectively coupling the first node to the third node according to the control signal comprises:

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providing a diode coupled between the first node and a fourth node; and

providing a second~~third~~ switch element for selectively coupling the fourth node to the third node according to the control signal.

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17. (currently amended) The method of claim 16, wherein:

the diode is formed by a transistor having ~~the~~its base and ~~the~~collector being

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shorted together, or having its ~~the gate and the drain of the first transistor being~~
shorted together.

18. (currently amended) The method of claim 16, wherein:

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the first switch element is an n-type transistor;
the second~~third~~ switch element is a p-type transistor;
the second node is ground; and
the third node is a constant supply voltage.

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19. (currently amended) The method of claim 16, wherein:

the first switch element is a p-type transistor;
the second~~third~~ switch element is an n-type transistor;
the second node is a constant supply voltage; and
15 the third node is ground.

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20. (currently amended) A method for controlling a switched capacitor circuit, the
method comprising the following steps:

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providing a positive side capacitor and a first positive side switch element;

providing a negative side capacitor and a first negative side switch element;

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disconnecting a first positive side node and a first negative side node from the
second node according to the control signal respectively utilizing the first positive
side switch element and the first negative side switch element, wherein the first
positive side node is coupled to the positive side capacitor and the first negative side
node is coupled to the negative side capacitor; and

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coupling the first positive side node and the first negative side node to the third node
being at a first predetermined charge voltage, such that when the first positive side
switch element and the first negative side switch element are switched off, a first
5 voltage difference across the first positive side switch element-in-the-off-state and a
second voltage difference across the first negative side switch element-in-the-
off-state both approach to a second predetermined charge voltage.

21. (original) The method of claim 20, further comprising selectively coupling the first
10 positive side node and the first negative side node to the third node according to the
control signal.

22. (currently amended) The method of claim 21, wherein selectively coupling the first
15 positive side node and the first negative side node to the third node according to the
control signal comprises:

providing a positive side diode coupled between the first positive side node and a
fourth node; and

20 providing a negative side diode coupled between the first negative side node and a
fourth node; and

providing a second~~third~~ switch element for selectively coupling the fourth node to
the third node according to the control signal.

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23. (currently amended) The method of claim 22, wherein:

the positive side diode is formed by a first transistor having its ~~the~~ base and the-

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collector being shorted together, or by having its the gate and the drain of the first
transistor being shorted together; and

5 the negative side diode is formed by a second transistor having its the base and the
collector being shorted together, or having its the gate and the drain of the second
transistor being shorted together.

24. (currently amended) The method of claim 23, wherein:

10 the first positive side switch element is an n-type transistor;
the first negative side switch element is an n-type transistor;
the second~~third~~ switch element is a p-type transistor;
the second node is ground; and
the third node is a constant supply voltage.

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25. (currently amended) The method of claim 23, wherein:

the first positive side switch element is a p-type transistor;
the first negative switch element is a p-type transistor;
20 the second~~third~~ switch element is an n-type transistor;
the second node is a constant supply voltage; and
the third node is ground.

26. (original) The method of claim 20, further comprising selectively coupling the first
25 positive side node to the first negative side node according to the control signal
utilizing a center switch element.

27. (new) A switched capacitor circuit comprising:

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a capacitor;

5 a first switch element for selectively coupling a first node to a second node
according to a control signal, wherein the first node is coupled to the capacitor; and

a charge circuit for coupling the first node to a third node being at a first
predetermined charge voltage when the first switch element is switched off to
thereby control a voltage at the first node to approach a second predetermined
10 charge voltage when the first switch element is switched off.

28. (new) The switched capacitor circuit of claim 27, wherein the charge circuit
comprises:

15 a diode coupled between the first node and a fourth node; and

a second switch element for selectively coupling the fourth node to the third node
according to the control signal.

20 29. (new) The switched capacitor circuit of claim 28, wherein:

the diode is formed by a transistor having its base and collector being shorted
together, or having its gate and drain being shorted together.

25 30. (new) The switched capacitor circuit of claim 28, wherein:

the first switch element is an n-type transistor;
the second switch element is a p-type transistor;

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the second node is ground; and
the third node is a constant supply voltage.

31. (new) The switched capacitor circuit of claim 28, wherein:
5 the first switch element is a p-type transistor;
the second switch element is an n-type transistor;
the second node is a constant supply voltage; and
the third node is ground.

- 10 32. (new) A switched capacitor circuit comprising:

a positive side capacitor;

15 a negative side capacitor;

a first positive side switch element for selectively coupling a first positive side node
to a second node according to a control signal, wherein the first positive side node is
coupled to the positive side capacitor;

- 20 a first negative side switch element for selectively coupling a first negative side
node to the second node according to the control signal, wherein the first negative
side node is coupled to the negative side capacitor; and

25 a charge circuit for coupling the first positive side node and the first negative side
node to a third node being at a first predetermined charge voltage to control a
voltage at the first positive side node and a voltage at the second positive side node
to approach a second predetermined charge voltage when the first positive side
switch element and the first negative side switch element are switched off.

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33. (new) The switched capacitor circuit of claim 32, wherein the charge circuit selectively couples the first positive side node and the first negative side node to the third node according to the control signal.

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34. (new) The switched capacitor circuit of claim 33, wherein the charge circuit comprises:

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a positive side diode coupled between the first positive side node and a fourth node;

a negative side diode coupled between the first negative side node and a fourth node;
and

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a second switch element for selectively coupling the fourth node to the third node according to the control signal.

35. (new) The switched capacitor circuit of claim 34, wherein:

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the positive side diode is formed by a first transistor having its base and collector being shorted together, or having its gate and drain being shorted together; and

the negative side diode is formed by a second transistor having its base and collector being shorted together, or having its gate and drain being shorted together.

25 36. (new) The switched capacitor circuit of claim 34, wherein:

the first positive side switch element is an n-type transistor;
the first negative side switch element is an n-type transistor;

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the second switch element is a p-type transistor;
the second node is ground; and
the third node is a constant supply voltage.

5 37. (new) The switched capacitor circuit of claim 34, wherein:

the first positive side switch element is a p-type transistor;
the first negative switch element is a p-type transistor;
the second switch element is an n-type transistor;
10 the second node is a constant supply voltage; and
the third node is ground.

38. (new) The switched capacitor circuit of claim 32, further comprising a center
switch element for selectively coupling the first positive side node to the first
15 negative side node according to the control signal.